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PROBLEMS.

22. Proposed by DE VOLSON WOOD, C. E., Professor of Mechanical and Electrical Engineering in Stevens Institute of Technology, Hoboken, New Jersey.

A prismatic bar having a uniform angular velocity ω and a linear velocity of v feet per second, suddenly snaps (by the disappearance of the cohesive force) into an indefinite number of equal parts; required the resultant angular velocity of each piece and the locus of the parts at the end of t seconds after rupture.

23. Proposed by ALFRED HUME, C. E., D. Sc., Professor of Mathematics, University of Mississippi, University Post Office., Mississippi.

A heavy particle is placed upon the surface $\sqrt{x}+\sqrt{y}+\sqrt{z}=c$. The axis of z being vertical and the coefficient of friction being $\sqrt{2}$, show that a point of equilibrium (all friction possible being brought into action) z is a harmonical mean between x and y.

MISCELLANEOUS.

Conducted by J. M. COLAW, Monterey, Va. All contributions to this department should be sent to him.

SOLUTIONS OF PROBLEMS.

13. Proposed by CHARLES E. MYERS, Canton, Ohio.

A soap bubble 2 inches in diameter, is filled with one part of hydrogen gas and 15 parts of air. If the bubble just floats in the air, find the thickness of the film.

I. Solution by H. C. WHITAKER, B. S., M. E., Professor of Mathematics, Manual Training School, Philadelphia, Pennsylvania.

Take, as the unit of weight, the weight of air filling a sphere of one inch radius, then the weight of a corresponding volume of hydrogen is .06927 and of a corresponding volume of water is 792.24. Take x=inner radius of sphere. The weight of the hydrogen is $\frac{.06927}{16}x^3$;

The weight of the air in the bubble is $\frac{15}{16}x^3$;

The weight of the water is $792.24(1-x^3)$;

The weight of the air displaced is 1.

Making the sum of the first three of these equal to the last and solving, $x=.999977$, and the required thickness is .000023 inches.